

Towards More Efficient Comprehensive Rotor Noise Simulation, Phase I

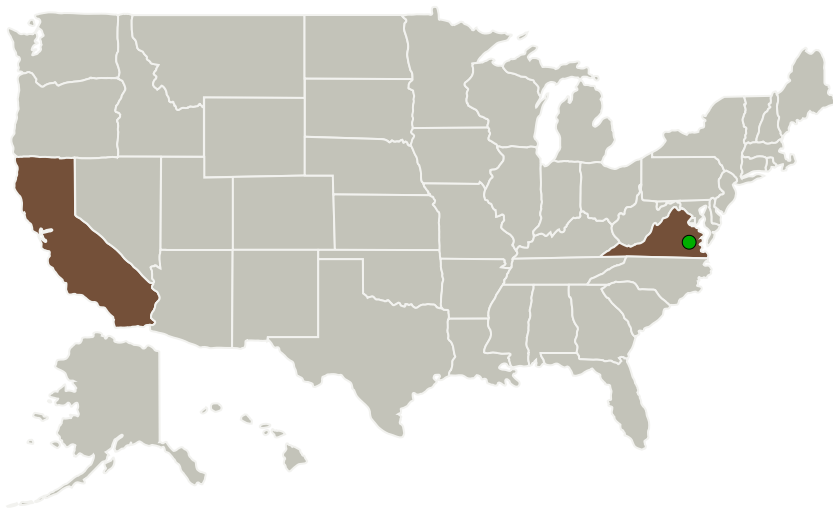
Completed Technology Project (2010 - 2010)



Project Introduction

Rotorcraft design and optimization currently still rely largely on simplified (low-fidelity) models, such as rotor disk or wake models to reduce the turn-around time and allow exploration of a large parameter space. On the other hand, accurate noise prediction requires first principle, high fidelity simulations to capture small scales, highly unsteady aerodynamic sources of noise. This forces us to resort to component-wise acoustics computations, ignoring the fact that different components in the system affect each other in generating noise. The objective of this proposal is to develop high fidelity rotor noise simulation capabilities that allow multi-components noise prediction and exploration of a large parameter space inherent to design processes. The distinctive aspect of the present proposal is the use of a novel discretization method based on Adaptive Vorticity Confinement technique to counteract the numerical dissipation of the underlying spatial discretization scheme in a dynamic fashion. The concept has been proven successful in controlled flow setting, allowing direct comparison with analytical solution and laboratory experiment. The primary task in this project is to extend this concept to general flow and computational environment, focusing on Blade-Vortex Interaction noise prediction as initially targeted milestone.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
CASCADE Technologies, Inc.	Lead Organization	Industry	Palo Alto, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138545>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CASCADE Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

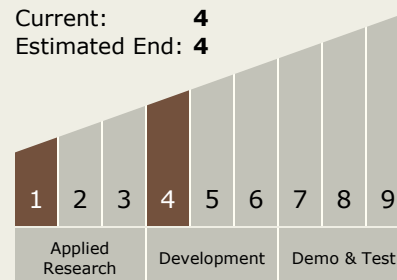
Carlos Torrez

Principal Investigator:

Bono Wasistho

Technology Maturity (TRL)

Start: **1**
 Current: **4**
 Estimated End: **4**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.4 Aeroacoustics

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System